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Filling gaps in the geographic distribution of *Anolis fuscoauratus* d'Orbigny, 1837 (Squamata, Dactyloidae) in the southeastern Brazilian Atlantic Forest

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Abstract
We update the southeastern distribution of *Anolis fuscoauratus* d'Orbigny, 1837 based on newly collected specimens and on specimens from scientific collections misidentified or deposited with questionable identifications. We include photographs showing the coloration of live individuals and a distribution map for this species in the southeastern Atlantic Forest of Brazil. Although this species is rather rare, it is more regionally widespread than previously realized and has an altitudinal range of approximately 30–800 m above sea level.

Key words
Reptilia; Iguania; Slender Anole; lizard; altitudinal range; new records.

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Introduction

The geographic distribution of the Slender Anole *Anolis fuscoauratus* d'Orbigny 1837 (Squamata, Dactyloidae), is only modestly known within the Atlantic Rainforest morphoclimatic domain (Ávila-Pires 1995), occurring from Rio Grande do Norte to Rio de Janeiro states (ca 5–24° S) (Vanzolini 1988, Goyannes-Araújo et al. 2009, Sousa and Freire 2010). *Anolis fuscoauratus* is a medium-sized (ca 50 mm SVL) arboreal forest-dwelling lizard (Ávila-Pires 1995, Vitt et al. 2008) that is widely distributed throughout the Amazonian forest in Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela (Avila-Pires 1995). However, within the southeastern Atlantic Rainforest of Brazil, this species is known only from disjunctive records in the states of Espírito Santo, Rio de Janeiro, and Minas Gerais (Rocha 1998, Cassimiro et al. 2006, Carvalho et al. 2007, Costa et al. 2009, Goyannes-Araújo et al. 2009).

The geographical range and a distribution map of *A. fuscoauratus* in the Southeast Region of Brazil was given by Goyannes-Araújo et al. (2009), and according to them, this species is only known from 4 records: 1 in Espírito Santo (Reserva Natural Vale, Municipality of Linhares; Rocha 1998); 1 in Minas Gerais (Municipality of Caratinga; Cassimiro et al. 2006); and 2 in Rio de Janeiro

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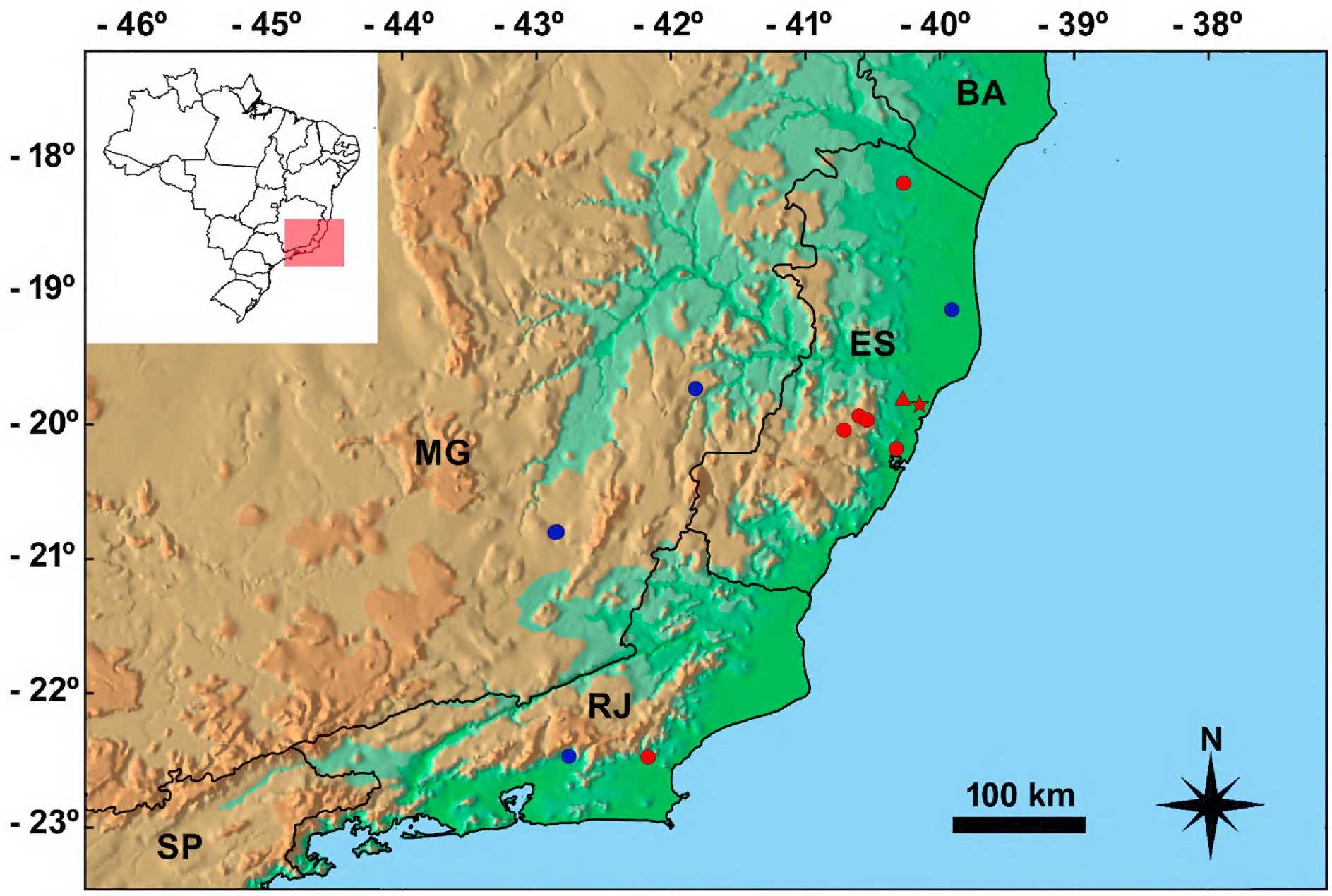

Figure 1. Map of the distribution of *Anolis fuscoauratus* d'Orbigny, 1837, within the southeastern Atlantic Rainforest of Brazil. Red symbols = data from present study; blue symbols = data from literature; circles = accurate coordinates; star = approximate coordinates; triangle = municipality coordinates.

state (Marambaia Island and Municipality of Cachoeiras de Macacu at Reserva Ecológica de Guapiaçu [REGUA]; Carvalho et al. 2007, as *Anolis* cf. *fuscoauratus*, Goyannes-Araújo et al. 2009, respectively). Subsequently, Costa et al. (2009) reported 3 specimens Minas Gerais (Municipality of Viçosa).

Methods

During recent fieldwork in southeastern Brazil, individuals of *Anolis fuscoauratus* were encountered by us and by colleagues, who provided us with their specimen and data.

Additionally, unreported specimens of *A. fuscoauratus* from Espírito Santo were found housed at the following institutional reptile collections: Museu de Biologia Prof. Mello Leitão (MBML), Instituto Nacional da Mata Atlântica, Espírito Santo, Brazil; Museu Nacional (MNRJ), Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; Museu de Zoologia João Moojen (MZUFV), Universidade Federal de Viçosa, Minas Gerais, Brazil; Museu de Zoologia "Prof. Adão José Cardoso" (ZUEC), Universidade Estadual de Campinas, São Paulo, Brazil; and Museum of Comparative Zoology (MCZ), Harvard University Cambridge, Massachusetts, USA.

All specimen identification reported herein were confirmed through collection visitation or high-resolution technical photos provided by curators. Some of those specimens were misidentified or with inconclusive determinations. Specific locations and coordinates are presented in Table 1.

Results

Data on specimens newly collected and on others found in scientific collections allowed us to add to the literature 13 additional specimens of *A. fuscoauratus* (Table 1). Thus, we fill gaps on the geographical distribution of this arboreal forest-dwelling lizard. The present work provides one new record from the state of Rio de Janeiro at the Municipality of Casimiro de Abreu (N=1), and 12 new records from the State of Espírito Santo at the municipalities of Aracruz (N=2), Santa Maria de Jetibá (N=1), Santa Teresa (N=7), Serra (N=1), and Montanha (N=1). It is worth of note that, since it was registered only through video images, which we could not access and confirm the species determination, *Anolis* cf. *fuscoauratus* reported from Marambaia island (Carvalho et al., 2007) will not be considered amongst our records. Literature and new records follow presented in Figure 1.

New records. Specimens newly collected by authors. Brazil: Rio de Janeiro: Municipality of Casimiro de Abreu, in the vicinity of BR 101 highway (22°28′26″ S, 042°10′13″ W; 70 m elevation), collected on August 2010 by Eduardo H. Wienskoski and TSS, 1 adult female (MNRJ 20703; 45.3 mm SVL) (Fig. 2). Espírito Santo:

Table 1. Data on specimens of *Anolis fuscoauratus* reported from the Southeast Region of Brazil derived from literature and from original data from the present work. Datum used for geographic coordinates of primary data: WGS84. For museum acronyms, see Methods. Other abbreviations: ES = Espírito Santo; MG = Minas Gerais; RJ = Rio de Janeiro; SVL = snout-vent length.

Voucher	Municipality, state	SVL (mm)	Latitidue (S)	Longitude (W)	Altitude (m)	Collected	Protected Area	Source
MBML 486	Aracruz, ES	46.5	19°49′13″	040°16′24″ [1]	—	Dec. 1992	—	Present work
MBML 562	Aracruz, ES	48.5	19°51′05″	040°08′57″ [2]	—	Oct. 1996	Pau Brasil Indigenous land	Present work
2 spec. not collected	Linhares, ES	—	19° 8′39″	039°54′34″	30	July–Aug. 1993	Reserva Natural Vale	Rocha, 1998
MBML 1977	Santa Maria de Jetibá, ES	52.1	20°02′26″	40°44′46″	690	Nov. 2004	—	Present work
MBML 198	Santa Teresa, ES	28.5	19°56′10″	040°36′00″	655	Aug. 1970	Parque do Museu de Biologia Prof. Mello Leitão (PMBML)	Present work
MBML 554	Santa Teresa, ES	47.0	19°56′10″	040°36′00″	655	Oct. 1998	PMBML	Present work
R-120274	Santa Teresa, ES	50.0	19°56′10″	040°36′00″	655	Oct. 1969	PMBML	Present work
MBML 1743	Santa Teresa, ES	50.4	19°57′53″	040°32′29″	650	Jan. 2006	Estação Biológica Santa Lúcia	Present work
MNRJ 9993	Santa Teresa, ES	50.9	19°57′53″	040°32′29″	650	Jan. 2003	Estação Biológica Santa Lúcia	Present work
MNRJ 14070	Santa Teresa, ES	48.7	19°57′53″	040°32′29″	650	Jan. 2006	Estação Biológica Santa Lúcia	Present work
MNRJ 16473	Santa Teresa, ES	45.9	19°57′53″	040°32′29″	650	Nov. 2002	Estação Biológica Santa Lúcia	Present work
MBML 3405	Serra, ES	50.0	20°10′48″	040°19′26″	245	July 2010	A.P.A. Mestre Álvaro	Present work
MBML 3472	Montanha, ES	51.5	18°12′05″	040°16′05″	120	Feb. 2016	—	Present work
MNRJ 20703	Casimiro de Abreu, RJ	45.3	22°28′26″	042°10′13″	60	Aug. 2010	—	Present work
MNRJ 16548	Cachoeiras de Macacu, RJ	50.0	22°28′09″	042°45′36″ [3]	70	Sept. 2007	Reserva Ecológica de Guapiaçu	Goyannes-Araújo et al. 2009
MZUSP 95078	Caratinga, MG	—	19°43′53″	041°49′00″ [3]	415	Dec. 2000	RPPN Feliciano Miguel Abdala	Cassimiro et al. 2006
MZUFV 285	Viçosa, MG	26.8	—	—	—	Apr. 1995	—	Costa et al. 2009
MZUFV 488	Viçosa, MG	53.1	20°47′52″	042°50′47″	780	Sept. 2005	—	Costa et al. 2009
MZUFV 609	Viçosa, MG	46.2	20°48′06″	042°51′49″ [3]	750	Dec. 2007	—	Costa et al. 2009

[1]Coordinates of municipality; [2]coordinates approximate; [3]datum not provided by author

Figure 2. Adult female *Anolis fuscoauratus* (MNRJ 20703) from the Municipality of Casimiro de Abreu, State of Rio de Janeiro, southeastern Brazil. Photo by Eduardo H. Wienskoski.

Figure 3. Adult male *Anolis fuscoauratus* (MBML 3405) from APA Mestre Álvaro, Municipality of Serra, State of Espírito Santo, southeastern Brazil. Photo by Thiago Marcial de Castro.

Municipality of Serra, Área de Proteção Ambiental do Mestre Álvaro (20°10′48″ S, 040°19′26″ W; 245 m elevation), collected on August 2010 by TMC, 1 adult male (MBML 3405; 50.0 mm SVL) (Fig. 3).

Furthermore, specimens found deposited in scientific collections misidentified or deposited with questionable identifications and records from literature follow in Table 1.

Discussion

According to Ávila-Pires (1995), Amazonian individuals of *A. fuscoauratus* in life are uniformly colored dorsally, with some specimens finely peppered, or presenting a mixture of colors or shades (i.e., changing from head to body or from mid-dorsum toward flanks); a light-colored vertebral stripe sometimes bordered by a narrower dark brown stripe may be present in some individuals (Avila-Pires 1995, Vitt et al. 2008).

Of the specimens we captured alive, the adult female (MNRJ 20703) was uniformly brown, darker on head, and presenting reddish brown blotches distributed along the body dorsum and anterior third of the tail; a vertebral stripe was absent. The adult male (MBML 3405) had a yellow dewlap; the dorsal background colour of the body and the head was uniformly brown, speckled with several dark dots, and maculated by dark brown marks. A large dark brown blotch was present over the shoulder girdle. The venter and gular region was cream-colored, faintly speckled with dark spots; a vertebral stripe was absent.

Regarding the altitudinal distribution of *A. fuscoauratus* in southeastern Brazil, this species is now known to occur from approximately 30 m above sea level at the Reserva Natural Vale, Municipality of Linhares, Espírito Santo (new record, herein) to 780 m in the Municipality of Viçosa, Minas Gerais (Costa et al. 2009), the highest altitude known for *A. fuscoauratus* in the Atlantic Rainforest.

The geographic coordinates of the record from the REGUA, Municipality of Cachoeiras de Macacu, Rio de Janeiro (Goyannes-Araújo et al. 2009) are incorrect due to mistyping. However, with the aid of Davor Vrcibradic (pers. comm.), we provide the correct coordinates in Table 1. Thus, the Goyannes-Araújo et al. (2009) record was from about 70 m above sea level.

Although 60 km apart, the records from Casimiro de Abreu and Cachoeiras de Macacu (REGUA), both in Rio de Janeiro state, share the distinction as being the southernmost records of *A. fuscoauratus* in southeastern Brazil. Cassimiro de Abreu is approximately 318 km northeast from a record at APA Mestre Álvaro, Serra, the southernmost record in Espírito Santo. The REGUA record is approximately 185 km northwest from the one at Viçosa, Minas Gerais, the most inland record for this species in southeastern Brazil (ca 200 km from the coast). Lastly, the new northernmost record at the Municipality of Montanha is approximately 112 km southeast from Reserva Natural Vale, Linhares, the northernmost record previously known in southeastern Brazil (Fig. 3).

Although the distribution of *A. fuscoauratus* remains moderately disjunct, the current data demonstrate that this species is more widespread in southeastern Brazil than formerly known (Goyannes-Araújo et al. 2009). This corroborates Vanzolini (1988) who suggested a wider distribution for this species in the southeastern Atlantic Forests of Brazil. Nevertheless, we consider data on *A. fuscoauratus* in the Atlantic Rainforest still scarce, and we encourage additional studies on its biology within this biome to elucidate if this scarcity is due to low population numbers or because of secretive behavior and habits.

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Authors' Contributions

TSS and ROLS reviewed collection's data; TMC collected the field data, TSS, PVS, TMC and ROLS interpreted data and wrote the text.

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